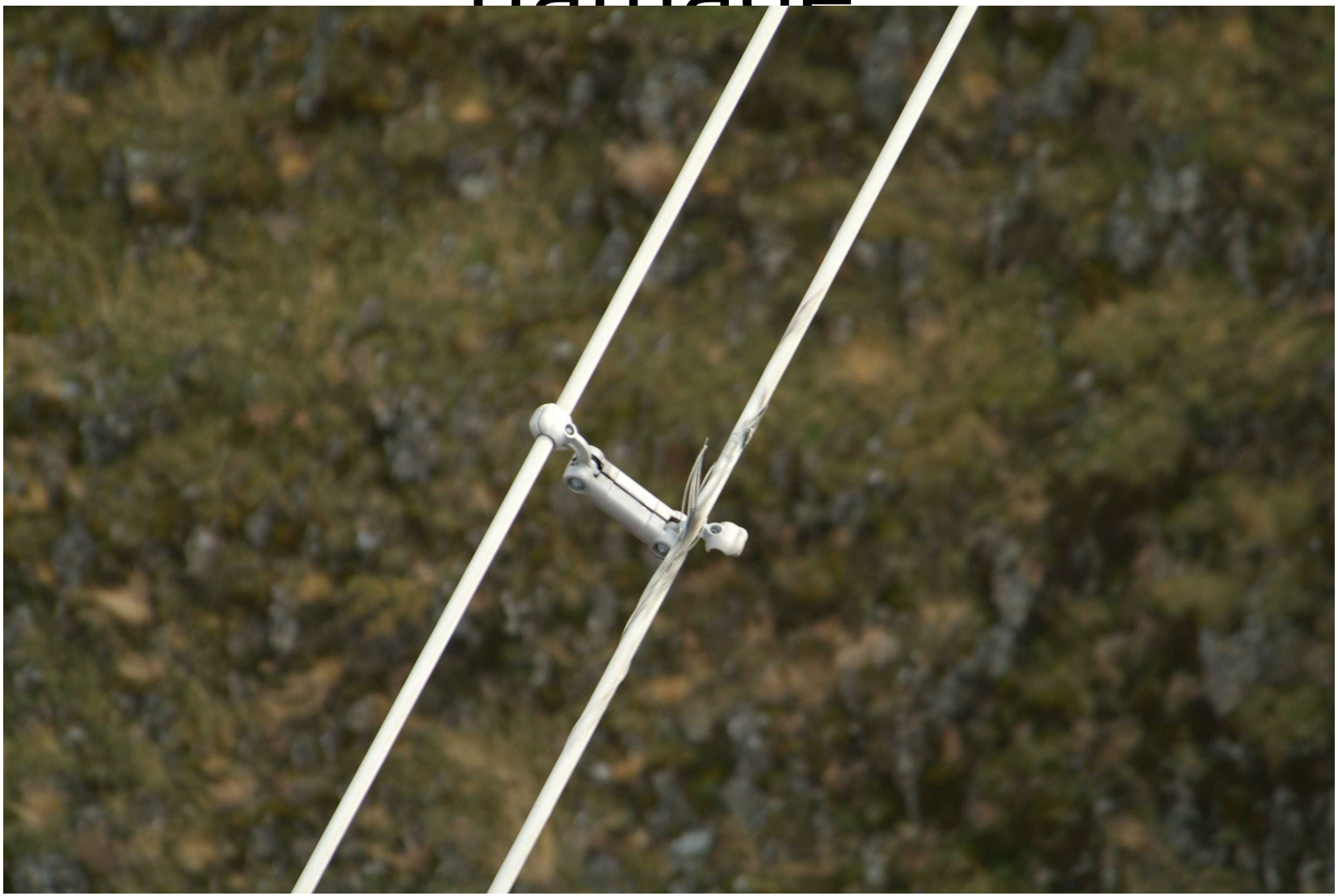
Dworshak-Taft 500 kV Line Daily Outage

June 12-30 0600-2000 Hours

Why is outage needed?

- Perform needed maintenance to prevent unplanned outage
  - Replace failed conductor spacer/dampers (7200 spacers on this line)
  - Repair damaged conductor
  - Repair damaged insulators and tower hardware on 97 towers
- Spacer damper replacement program is high priority for BPA

Examples of conductor damage



Examples of conductor damage

Limited Outage Window Opportunities

- Access to portion of line needing repair is only available from June-October.
- System impacts to outage greatest in July-August period during high transfer periods
- This limits outage periods to June and September-October.
- June has potential to limit Western Montana hydro and thermal generation.
- September-October has potential to limit thermal generation.

Maximizing Work Crews

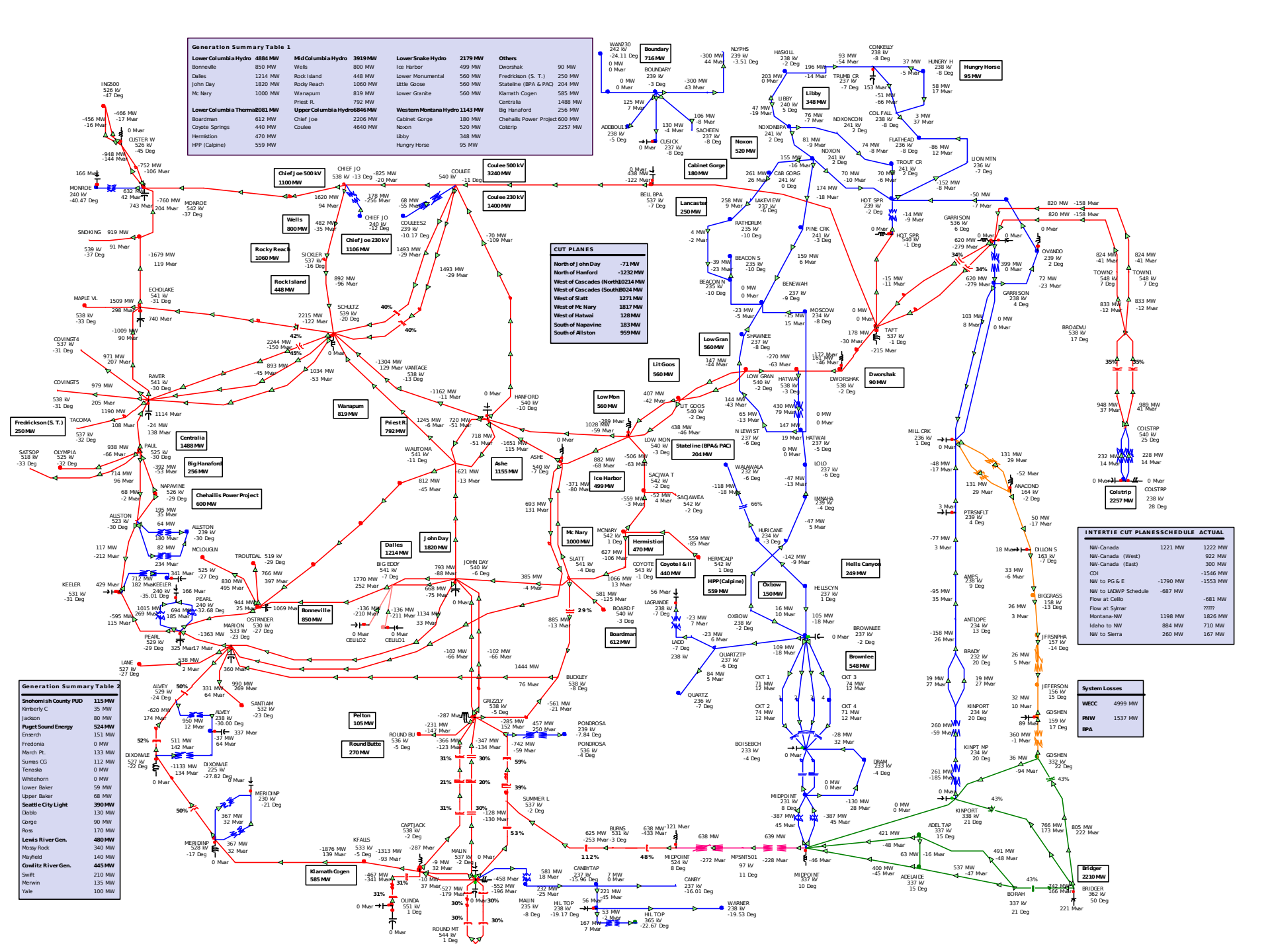
- Six crews are being used to maximize the work completed during the outage.
  - Crews must repair damaged conductor before they can replace spacer dampers
  - As conductor is repaired crews will get on repaired conductor sections and replace spacer dampers

Emergency Conditions

- Daily outages allow canceling next day outage if water restrictions a problem
- Daily outage also allow higher West of Hatwai flows during off-peak period when they are typically the highest due to lighter load conditions
- Line can be put back into service within 5 hours

Addition of Coulee-Bell 500 kV line

- Impacts of a Dworshak-Taft line outage has been greatly reduced by the addition of the parallel Coulee-Bell 500 kV line in late 2004.
- West of Hatwai was limited to 1100 MW E>W when the Dworshak-Taft line was out of service prior to the Coulee-Bell 500 kV line addition.
- West of Hatwai is limited to 2550 MW E>W when the Dworshak-Taft line is out of service with the Coulee-Bell 500 kV line in service.


Generation Summary Table 1
Lower Columbia Hydro 4884 MW
Bonneville 850 MW
Dalles 1214 MW
John Day 1820 MW
Mc Nary 1000 MW
Lower Columbia Thermal 2081 MW
Boardman 612 MW
Coyote Springs 440 MW
Hermiston 470 MW
HPP (Calpine) 559 MW
Mid Columbia Hydro 3919 MW
Wells 800 MW
Rock Island 448 MW
Rocky Reach 1060 MW
Rocky R. 792 MW
Wanapum 819 MW
Priest R. 792 MW
Upper Columbia Hydro 6846 MW
Chief Joe 2206 MW
Coulee 4640 MW
Grand Coulee 6809 MW
Lower Snake Hydro 2179 MW
Ice Harbor 499 MW
Lower Monumental 560 MW
Little Goose 560 MW
Lower Granite 560 MW
Western Montana Hydro 1143 MW
Cabinet Gorge 180 MW
Noxon 520 MW
Libby 348 MW
Thermal 256 MW
Big Hanaford 256 MW
Centralia 1488 MW
Chehalis Power Project 600 MW
Fredrickson (S. T.) 250 MW
Others
Dworshak 90 MW
Fredrickson (S. T.) 250 MW
Stateline (BPA & PAC) 204 MW
Chehalis Power Project 600 MW
Colstrip 2257 MW
Hungry Horse 95 MW
Generation Summary Table 2
Snohomish County PUD 115 MW
Kimberly C 35 MW
Jackson 80 MW
Puget Sound Energy 524 MW
Enserch 151 MW
Fredonia 0 MW
March Pt. 133 MW
Sumas CG 112 MW
Tenaska 0 MW
Whitehorn 0 MW
Lower Baker 59 MW
Upper Baker 68 MW
Seattle City Light 390 MW
Diablo 130 MW
Gorge 90 MW
Ross 170 MW
Lewis River Gen. 480 MW
Mossy Rock 340 MW
Mayfield 140 MW
Cowlitz River Gen. 445 MW
Swift 210 MW
Merwin 135 MW
Yale 100 MW
CUT PLANES
North of John Day -71 MW
North of Hanford -1232 MW
West of Cascades (North) 10214 MW
West of Cascades (South) 8024 MW
West of Slatt 1271 MW
West of Mc Nary 1817 MW
West of Hatwai 128 MW
South of Napavine 183 MW
South of Allston 959 MW
INTERTIE CUT PLANES SCHEDULE ACTUAL
NW-Canada 1221 MW 1222 MW
NW-Canada (West) 922 MW
NW-Canada (East) 300 MW
CDI -1546 MW
NW to PG & E -1790 MW -1553 MW
NW to LADWP Schedule -687 MW
Flow at Cello -681 MW
Flow at Sylmar ?????
Montana-NW 1198 MW 1826 MW
Idaho to NW 884 MW 710 MW
NW to Sierra 260 MW 167 MW
System Losses
WECC 4999 MW
PNW 1537 MW
BPA
ING500 526 kV -47 Deg
MONROE 240 kV -40.47 Deg
CUSTER W 526 kV -45 Deg
MONROE 542 kV -37 Deg
SNOKING 539 kV -37 Deg
MAPLE VL 538 kV -33 Deg
ECHOLAKE 541 kV -31 Deg
COVINGT4 537 kV -31 Deg
COVINGT5 538 kV -31 Deg
RAVER 541 kV -30 Deg
TACOMA 537 kV -32 Deg
SATSOP 518 kV -33 Deg
OLYMPIA 525 kV -32 Deg
PAUL 525 kV -30 Deg
NAPAVINE 526 kV -29 Deg
ALLSTON 523 kV -30 Deg
ALLSTON 239 kV -30 Deg
MCLOUGLN
TROUTDAL 519 kV -29 Deg
KEELER 531 kV -31 Deg
KEELER
PEARL 240 kV -32.68 Deg
PEARL 529 kV -29 Deg
MARION 533 kV -23 Deg
OSTRNDER 530 kV -27 Deg
LANE 527 kV -27 Deg
ALVEY 529 kV -24 Deg
ALVEY 238 kV -30.00 Deg
SANTIAM 532 kV -23 Deg
DIXONVLE 527 kV -22 Deg
DIXONVLE 225 kV -27.82 Deg
MERIDNP 230 kV -21 Deg
MERIDNP 528 kV -17 Deg
MERIDNP
CHIEF JO 538 kV -13 Deg
CHIEF JO 240 kV -12 Deg
SICKLER 537 kV -16 Deg
SCHULTZ 539 kV -20 Deg
COULEE 540 kV -11 Deg
COULEES2 239 kV -10.17 Deg
WAUTOMA 541 kV -11 Deg
HANFORD 540 kV -10 Deg
VANTAGE 538 kV -13 Deg
ASHE
BIG EDDY 541 kV -7 Deg
JOHN DAY 540 kV -6 Deg
MCNARY 542 kV 1 Deg
SLATT 541 kV -4 Deg
COYOTE 543 kV -1 Deg
BOARD F 540 kV -3 Deg
CEUILO2
CEUILO1
BUCKLEY 538 kV -8 Deg
GRIZZLY 538 kV -5 Deg
ROUND BU 536 kV -5 Deg
PONDROSA 239 kV -7.84 Deg
PONDROSA 536 kV -4 Deg
CAPTJACK 538 kV -2 Deg
KFALLS 533 kV -5 Deg
MALIN 537 kV -2 Deg
MALIN 235 kV -8 Deg
OLINDA 551 kV 1 Deg
ROUND MT 544 kV 1 Deg
HILTOP 238 kV -19.17 Deg
HILTOP 365 kV -22.67 Deg
CANBYTAP 237 kV -15.96 Deg
CANBY 237 kV -16.01 Deg
MIDPOINT 524 kV 8 Deg
MIDPOINT 231 kV 8 Deg
MIDPOINT 337 kV 10 Deg
MPSNT501 97 kV 11 Deg
BURNS 531 kV -3 Deg
BELL BPA 537 kV -7 Deg
WARNER 238 kV -19.53 Deg
BOISEBCH 233 kV -4 Deg
DRAM 233 kV -4 Deg
WAN230 242 kV -24.11 Deg
BOUNDARY 239 kV -3 Deg
ADDBOUN 238 kV -5 Deg
CUSICK 237 kV -8 Deg
SACHEEN 237 kV -8 Deg
NOXONBPA 241 kV 2 Deg
NOXONCON 241 kV 2 Deg
NOXON 241 kV 2 Deg
CAB GORG 241 kV 0 Deg
LAKEVIEW 237 kV -6 Deg
RATHDRUM 235 kV -10 Deg
BEACON S 235 kV -10 Deg
BEACON N 235 kV -10 Deg
BENEWAH 237 kV -9 Deg
SHAWNEE 237 kV -8 Deg
LOW GRAN 540 kV -2 Deg
HATWAI 538 kV -3 Deg
LIT GOOS 540 kV -2 Deg
LOW MON 540 kV -3 Deg
N LEWIST 237 kV -6 Deg
WALAWALA 232 kV -6 Deg
SACJWA T 542 kV -2 Deg
SACJAWEA 542 kV -2 Deg
HURICANE 234 kV -3 Deg
HATWAI 237 kV -5 Deg
LOLO 237 kV -6 Deg
IMNAHA 239 kV -4 Deg
HELLSCYN 237 kV 1 Deg
HERMCALP 542 kV 1 Deg
OXBOW 238 kV -2 Deg
LAGRANDE 238 kV -7 Deg
LADD 238 kV -7 Deg
QUARTZTP 237 kV -6 Deg
QUARTZ 236 kV -7 Deg
CKT 1 71 MW 12 Mvar
CKT 2 74 MW 12 Mvar
CKT 3 74 MW 12 Mvar
CKT 4 71 MW 12 Mvar
BROWNLEE 237 kV -2 Deg
HAZELTON 238 kV -2 Deg
TRUMB CR 237 kV -7 Deg
LIBBY 240 kV 5 Deg
COLFALL 238 kV -8 Deg
FLATHEAD 236 kV -8 Deg
TROUT CR 241 kV 2 Deg
LION MTN 236 kV -7 Deg
HOT SPR 239 kV -2 Deg
HOT SPR 540 kV -1 Deg
TAFT 537 kV -1 Deg
DWORSHAK 538 kV -2 Deg
CONKELLY 238 kV -8 Deg
HUNGRY H 238 kV -8 Deg
GARRISON 536 kV 6 Deg
GARRISON 238 kV 4 Deg
OVANDO 239 kV 2 Deg
TOWN2 548 kV 7 Deg
TOWN1 548 kV 7 Deg
BROADJU 538 kV 17 Deg
COLSTRP 540 kV 25 Deg
COLSTRP 238 kV 28 Deg
MILL CRK 236 kV 1 Deg
ANACOND 164 kV -2 Deg
PTRSNFLT 239 kV 4 Deg
DILLON S 163 kV -7 Deg
BIGGRASS 158 kV -13 Deg
JFRSNPHA 157 kV -14 Deg
JEFFERSON 156 kV 15 Deg
GOSHEN 159 kV 17 Deg
GOSHEN 332 kV -22 Deg
KINPORT 234 kV 20 Deg
KINPT MP 234 kV 20 Deg
KINPORT 338 kV 21 Deg
ADEL TAP 337 kV 15 Deg
ADELAIDE 337 kV 15 Deg
BORAH 337 kV 21 Deg
BRIDGER 362 kV 50 Deg
ANTELOPE 234 kV 13 Deg
BRADY 232 kV 20 Deg
AMES 238 kV 9 Deg
Chief Joe 500 kV 1100 MW
Chief Joe 230 kV 1106 MW
Rocky Reach 1060 MW
Rock Island 448 MW
Wells 800 MW
Wanapum 819 MW
Priest R. 792 MW
Ashe 1155 MW
Low Mon 560 MW
Lit Goos 560 MW
Low Gran 560 MW
Lancaster 250 MW
Cabinet Gorge 180 MW
Noxon 520 MW
Libby 348 MW
Coulee 500 kV 3240 MW
Coulee 230 kV 1400 MW
Dalles 1214 MW
John Day 1820 MW
Mc Nary 1000 MW
Ice Harbor 499 MW
Hermiston 470 MW
Coyote & II 440 MW
HPP (Calpine) 559 MW
Oxbow 150 MW
Boardman 612 MW
Hells Canyon 249 MW
Brownlee 548 MW
Pelton 105 MW
Round Butte 270 MW
Klamath Cogen 585 MW
Bridger 2210 MW
Colstrip 2257 MW
Dworshak 90 MW
Hungry Horse 95 MW

Four outages periods planned for this work

- To complete all necessary work, additional outages are planned for Fall 2006, June 2007, and Fall 2007.